CLAIMS

1. A fuel cell system comprising flow passages and/or flow chambers which conduct moist gases in operation, and wherein at least a part of the flow passages and/or flow chambers are provided with a coating which, at low temperatures, takes up water in distributed form and releases the water at least in part again at higher temperatures.

2. A fuel cell system in accordance with claim 1, wherein the coating is a silicate with the general formula:

$X_{12}[(Al\ O_2)_{12}(Si\ O_2)_{12}] \cdot xH_2O$

or $X_{12}(Al_{12}Si_{12}O_{24}) \cdot xH_2O$

or $X_{43}(Al_{43}Si_{83}O_{24}) \cdot xH_2O$

or $X_{28}(Al_{28}Si_{68}O_{96}) \cdot xH_2O$

where X = Li, Na, K, Rb, or Cs and x is an integer and the water is taken up in the pores of the coating which have sizes in the nanometer range.

3. A fuel cell system in accordance with claim 1, wherein the coating is a silicate with the general formula:

$Y_6[(Al\ O_2)_{12}(Si\ O_2)_{12}] \bullet xH_2O$, where Y = Be, Mg, Ca, Sr, or Ba, and x is an integer and the water is taken up in the pores of the coating which have sizes in the nanometer range.

4. A fuel cell system in accordance with claim 1, wherein the coating comprises alkaline and alkaline earth aluminum silicates, i.e. so-called zeolites.

5. A fuel cell system in accordance with claim 1, wherein the coating comprises polysiloxane.

6. A fuel cell system in accordance with claim 1, wherein the coating comprises a polymer which is provided with acid radicals or alkaline radicals which have a chemical affinity for water.

7. A fuel cell system in accordance with claim 6, wherein the polymer is a modified polyethylene glycol.

8. A fuel cell system in accordance with claim 1 having a hydrogen circuit, wherein the coating is present at the inner side of the tubes and the passages which are present at the anode side of the fuel cells.

9. A fuel cell system in accordance with claim 1 having a hydrogen circuit, wherein the coating is located at the inner side of the tubes and the passages which are present at the cathode side of the fuel cells.

10. A method for operating a fuel cell system with flow passages and/or flow chambers which conduct moist gases in operation, comprising after switching off of the fuel cell system at least a part of the water contained in the moist gases, absorbing the moist gases with a coating which is located on the inner side of at least a part of the flow passages and/or flow chambers is stored there, in that freezing of the water does not occur or only occurs to a non-damaging extent at temperatures below zero and in that, on recommencing the operation of the fuel cell system with the associated heating up, the water stored by the coating is released again, at least in part, and is exploited for the required humidification of the gases.

11. A method in accordance with claim 10, wherein the quantity of the coating is selected so that the relative humidity of the gases over the effective temperature range of the fuel cell system remains at least substantially constant.

12. A method in accordance with claim 11, wherein the relative humidity is selected at approximately 50%.